

Ozone Generator

OZ-5G Vanward

INSTRUCTION MANUAL



Notice: The machine should be installed in clean and dry with good air circulation.
To extend service life, please keep the machine clean and keep it from water and moisture.

Some components and apparatuses indicated in instruction manual and graphic illustrations need be purchased separately. For detail, please refer to the instruction manual!



Warning: To avoid high-voltage injury, the external cabinet cannot be opened by un-professionals or while the machine is on switch!

Before installation and operation, please read the instruction manual carefully!

Important Statement

The copy right of this document belongs to our company. Without written authorization from our company, it cannot be extracted, copied or translated by any unit or individual in any way. Any violation will be investigated!

The right to revise parameters and specifications in this manual is reserved by our company. We will timely improve errata and deviations compared with the latest documents. All these changes will be present in new editions, but not announced in advance.

Ultimate right of explanation to this manual belongs to our company.

All the illustrations in this manual are for better explanation, and maybe differ from real new products. It depends on practical improvement in technique and the specific time new products come out. Were there any deviation between description in this manual and your product, it should be subject to the product.

Attentions

Don't use this product near high-precise electronic equipment, because electric wave may cause mal-operation of the high-precise electronic equipment and other problems. Special attentions should be paid to the equipments as follows: hearing aid, pacemaker and other electro-medical equipment, fire detector, other high-precise automatic control equipments.

Don't dismantle or reconstruct this product, otherwise it will lead to damage, electrical leakage and faults in electrical circuit.

High moisture, penetration of water and other liquids to the product may lead to electrical leakage and other faults.

To avoid damage on the surface of equipment, volatile solution or organic solvent should not be employed in cleaning.

To eliminate potential fire danger, qualified special grounding cable, reliable grounding, and wire with enough capacity are required. In maintenance on working equipment, the staff must have been trained.

While using ozone, workers are not permitted to work in a space with high concentration ozone. To work in a space with over-standard ozone concentration, protective measures must be taken.

Keep in mind that maintenance can only be carried out when the equipment is off power and air pressure is completely released.

Make sure the lines of electricity, gas, water, inlet and outlet air pipes are properly connected.

Operation environment of the product

1. There shall be no flammable and explosive gas and conductive powder dusts in the room. It's not permitted to install the equipment in a place where alkaline air is easy to leak or with risk of explosion.
2. Indoor installation only, with electrical power supply of 220V/50Hz AC power (Or 110V 50-60Hz).
3. Ambient temperature:-10°C~37°C
4. Ambient humidity:≤90%
5. The ground for equipment installation must be horizontal, and the equipment shall be placed on ground or supports steadily.
On installation, there must be draft fan or air conditioner to keep air dry and the operating environment in good ventilation.

Disclaimer

To those natural disasters beyond our responsibility (such as earthquake, flood, etc) or losses caused by any human behavior or accident (including misuse by the user, intentionally or unexpectedly, in these accidental or other abnormal occurrences), we will not take any responsibility.

To those losses brought by improper operation of the product, such as profit loss of the company, production suspension, etc. we will not take any responsibility.

We are not responsible for the event that the sterilization standards can't be met because of improper operation or machine fault.

We are not responsible for losses caused by not operating according to this instruction manual.

Honorable customer:

Thanks for your choice of our products!

To properly use the product, please read this instruction manual in detail. Were there any problem in using, please timely contact the distributor or our company. We are ready to serve you all the time.

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1. Preface

1.1 As one of the most powerful oxidants, ozone is a colorless gas with little offensive smell of grass, and is a generally-admitted environment-friendly disinfectant. Ozone is the allotropicity of oxygen, with same element composition but different structural appearance, and their performances are quite different.

With oxidation reduction potential only less than F₂, ozone shows very powerful oxidation capacity. Oxidation reduction potentials of different materials are shown in Table 1

Table 1 Comparison of oxidation reduction potentials

Name and molecular formula	Standard electrode potential (Voltage)	Name and molecular formula	Standard electrode potential (Voltage)
Fluorine F ₂	2.87	Permanganic acid ion MnO ₄	1.67
Ozone O ₃	2.07	Chlorine dioxide ClO ₂	1.50
Hydrogen dioxide H ₂ O ₂	1.78	Chlorine Cl ₂	1.36

1.2 Ozone is used in four fields, i.e. water treatment, chemical oxidation, food processing and medical treatment.

1.2.1 Water treatment

Ozone can effectively and rapidly kill bacteria, virus and other microbes in water; completely remove organic compound and other pollutant, but not bring about secondary pollution. There will be chloroform, bromine dichloromethane, carbon tetrachloride and other chloridized organics (THM) with carcinogenicity, if polluted water source is treated by chlorinating. Using ozone in treatment, there will be no secondary pollutant. Sewage treatment includes civil sewage, industrial sewage and medical sewage, with main purpose of sterilizing, removing pollutant, decolorizing and eliminating stink to meet discharge standard. Treating swimming pool water with ozone, the water will be limpid and transparent, and some problems caused by using chlorine, such as yellow hair and stimulation on eyes, skin and respiratory tract will be thoroughly settled. Its effectiveness and advantage have been generally accepted.

Cooling Tower Association of USA has recommended using ozone to treat cooling recycle water to reduce and remove instructions, disinfect and eliminate algae, prevent corrosion and stabilize water quality.

1.2.2 Chemical oxidation

Ozone has been used in chemical engineering, petroleum, paper making, textile, pharmacy, spice and other industries, as oxidant, catalyst and refining agent. The powerful oxidation capacity of ozone can easily break carbon chains in alkenes, alkyne organics, and partially oxidize them to form new chemical compounds. In purifying biological and chemical air pollutant, stink in factories processing furs, coating enterics and fish, polluted gas in rubber and chemical factories can all be decomposed and eliminated by ozone. Ozone works as a catalyst in pesticide synthesis, but to some pesticide remains, it can also oxidize and decompose them.

1.2.3 Food processing

Given its powerful sterilization capacity and advantage of zero polluted remains, ozone is widely used in food processing industry for disinfection and stink removal, mould control and refreshing. Food and Drug Administration revised the stipulation that always deemed ozone as food additive and limited its use in April, 1997, allowing using ozone in food processing and storage without authorization. It has great influence in enhancing technical progress and improving food quality.

1.2.4 Medical treatment

It's mainly used for air sterilization in sickroom and operating room that ozone is generalized in China but many therapeutic researches have been conducted abroad. Physicians and dentists in Germany, Switzerland, Russia, France and Italy have applied ozone in treatment for many years, such as using ozone water in oral operation and artificial teeth mounting to keep oral cavity germ free, treating cancer with ozone and radiation therapy combined, drinking ozone water to cure gynecological diseases, and injecting ozone to cure fistula, piles and varicosity, etc.

1.3 Proper use ozone is safe and harmless

1.3.1 As a gaseous sterilant, ozone can effectively kill virus, bacterium, mould and other microbes depending on its oxidization capacity. Like any antiseptic, it will cause certain physiological reaction and even damage, but the amount is much less than normal antiseptics, and is easier to protect. On smelling its specific odor, mucous membrane in respiratory tract will response to cause dry mouth and cough: strong stimulation will cause sore throat and lassitude; it will need a few hours to recover, but there is still not a case of death caused by ozone. As an antiseptic with vigorous sterilization capacity, ozone can automatically decompose. Leaving no any remaining pollution. Discomfort will immediately vanish once leaving the site, and it's hard for formaldehyde, peroxyacetic acid, potassium permanganate, and other common antiseptics to match.

1.3.2 Industrial health standards for ozone: International Ozone Association: 0.1 PPM, contact period 10 hours. USA: 0.1 PPM, contact period 8 hours. Germany, France, Japan: 0.1 PPM. China PR: 0.15.

2. Brief introduction of OZ series ozone generator

2.1 IGBT technique (from Germany Infineon Technologies AG) is adopted in this series of ozone generators. Ozone is generated by corona discharge, and the discharge chamber is composed of de-hydroxyl tube-form generators. Particular anti-backwater design makes its service life much longer than that of ordinary factories. Modular design is adopted in electrical circuit. Dielectric element, pipeline and fastening for conveying ozone are all ozone-resistant to ensure long service life, enough corona density, low temperature, and much higher ozone concentration.

3. Composition

3.1 Generator unit (electric circuit board, high-voltage generator, discharge chamber), stainless steel external cabinet, 65L air pump (maybe some products are not equipped with 65L air pumps), ammeter, 150 type fan from Taiwan, connection tube line, ozone regulating apparatus, indicating light.

4. Technical parameter and product pictures (Remarks: There may be some changes in the parameters and pictures)

Table 2 Technical parameters

Type	OZ-3G	OZ-5G	OZ-7G	OZ-10G	OZ-15G
Parameters					
Ozone yield with oxygen source input (g/h)	3	5	7	10	15
Amount of oxygen input (L/min)	2	3	5	5	6.5
Ozone yield with dry air source input (g/h)	3.5	3.5	3.5	5	7.5
Cooling style	Air Cooled				
Maximum ozone	Oxygen source: 25~50 Dry air source: 5~15				

concentration (g/m ³)					
L x W X H mm	350x250x560	350x250x560		350x250x560	
Weight kg	11	12	12	13	13
Power W	140	160	160	180	200
Max operating current	≤0.3 A	≤0.35 A	≤0.40 A	≤0.45 A	≤0.55 A
Interface sizes	Φ6.5mm Ozone-resisting soft duct Φ5mm*8mm along with equipment delivery is for choice				
Power source	220V 50HZ (In China) 110V 50~60HZ (Some regions abroad)				
Gas source	Oxygen (oxygen cylinder or oxygen generator); or clean and dry air input pressure to ozone generator must be ≤0.2Pa(≤2kgf/cm ²); medical oxygen pressure regulator is required to be adopted while using oxygen source; input pressure of compressed air should meet standard, otherwise pressure regulator is necessary; input oxygen source must refer to and meet relevant standard.				

4.2 Product pictures



Fig.1 OZ-3G



Fig.2 OZ-5G OZ-7G



Fig.3 OZ-10G OZ-15G

5. External appearance

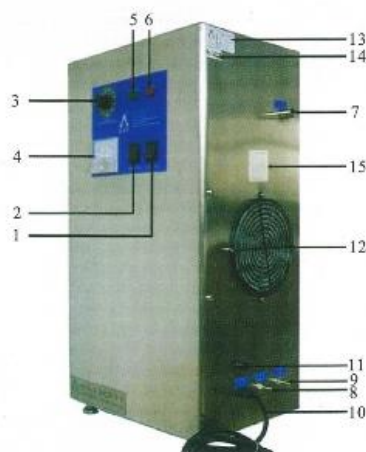


Fig.4 External appearance

5.1 Table 3 Illustration to external appearance

1	Switch for air pump (if eligible pressure compressed gas source is supplied from outside, there may not be air pump integrated)	9	Oxygen inlet $\Phi 6.5\text{mm}$ Ozone-resisting soft duct $\Phi 5\text{mm} \times 8\text{mm}$ along with equipment delivery is for choice
2	Power switch for whole equipment	10	Power line
3	Ozone regulating turn-button	11	Fuse tray 5A fuse
4	Ammeter	12	Fan fence net Regular maintenance: clean once every 1-3 months
5	Ozone working indicating light	13	Certificate on delivery
6	Air pump working indicating light	14	Equipment code (some are printed on external shell) Every equipment has the unique code, which has been recorded by our company before delivery. Properly keep the code; it is necessary for warranty and repair service
7	Air outlet $\Phi 6.5\text{mm}$ Ozone-resisting soft duct $\Phi 5\text{mm} \times 8\text{mm}$ along with equipment delivery is for choice		
8	Ozone outlet $\Phi 6.5\text{mm}$ Ozone-resisting soft duct $\Phi 5\text{mm} \times 8\text{mm}$ along with equipment delivery is for choice	15	Table of technical parameters

6. Internal Structure

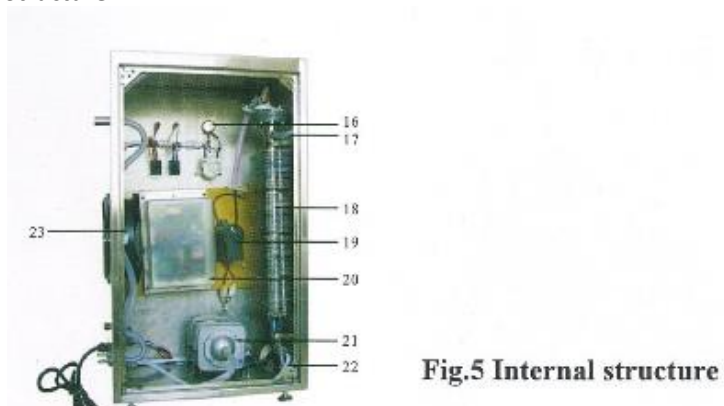


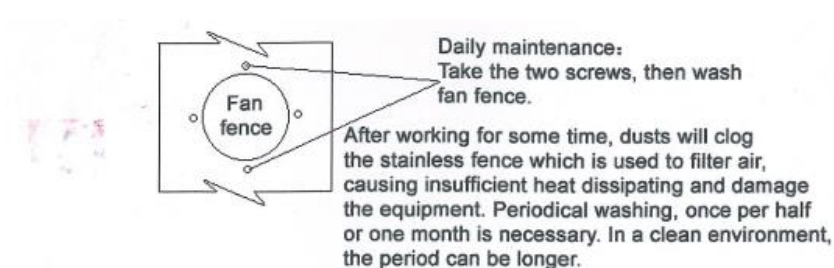
Fig.5 Internal structure

6.1 Table 4 Illustration to internal structure

16	Regulation resistance for current regulating	20	Circuit board
17	Inlet pipe to ozone generator tube (PVC-U pipe)	21	65L air pump (maybe soome products are not equipped with 65L air pumps)
18	Ozone generator tube	22	Outlet pipe to ozone generator tube (PVDF pipe)
19	High-voltage unit	23	150 type fan

7. Maintenance

7.1 Daily maintenance



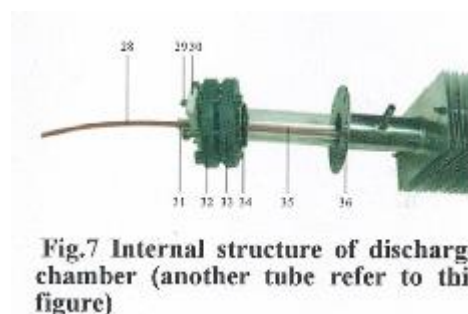
7.2 Cleansing of ozone generator tube

7.2.1 Special reminder: Normally, the generator tube cannot be opened or cleansed. If the generator cannot work because of your abnormal operation and installation, our company will not take maintenance responsibility. Be sure that you have enough professional technique before cleansing, otherwise, please contact local distributor or after-sale service department of our company.

7.2.2 If unclean air source is input or the equipment has been working for more than 12 months, there will be something (dust, for example) attached on the surface of discharge tube inside discharge chamber, which will clog discharge space and lead to insufficient discharge, causing yield of ozone drop. Then the ozone generator tube should be cleansed.

7.2.3 Cleansing method 1: dismantle generator tube 18; input cleansing liquid (such as all-purpose cleanser or other liquid can be used for cleansing); input washing water with some pressure repeatedly till clean, then lead dry air in.

7.2.4 Cleansing method 2: ① Dismantle discharge chamber 18 as indicated in Fig.7; ② dismantle stainless screw 29, remove ceramic strip 30; ③ relax slightly all the stainless screws a little on discharge chamber before dismantle completely (very important), then dismantle every screw; ④ remove PVDF flange 32,33; fluorine rubber seal ring 34 can be left on inner tube 35; ⑤ take out inner tube 35, clean the surface; ⑥ clean inner surface of outer tube 36; ⑦ assemble all the cleaned parts according to Fig.7; while install stainless screws, first wrench to a state of less-tight, then after checking, continue till tight enough (don't be too tight or with great force; with torque wrench, 6—8NM); ⑧ conduct leakage examination to confirm there is no air leakage, then install it to ozone generator.



Chamber

8. Product Picture and Instruction with internal heating and drying tube.

(Notice: The heating and drying tube will be included only according to your requirement and extra payment for it, the ordinary ozone generator is excluded the heating and drying tube).



Picture 8, Instruction of product with heating and drying tube.

Table 5 Instruction of product with heating and drying tube to internal structure

24	Drying tube
25	Temperature control thermostat, stop heating while the temperature is higher than 60°C
26	Switch for heating The ozone generator stops while heating
27	Heating tube has the specification of $\Phi 9.5\text{mm} \times 200\text{mm}$, capacity $\leq 400\text{W}$ and 220V, 50/60Hz

8.2 Instruction for heating and drying tube

There are lost of water, oil and dust in the air. If they are not eliminated, it will influence the ozone capacity and lifespan of the ozone generator.

The product with internal heating and drying tube is easy to operate and it can supply the dry air resource in an economic way.

8.3 Product instruction with internal heating and drying (see picture 10)

During the ozone generator working, the water and other undesired substance in the air will be absorbed by the drying material in the drying tube, then evaporated to the air through heating the heating tube. specific usage as followings:

- a. The heating interval is every 12 working hours; if the air is dry, the heating interval can be 24 working hours or longer.
- b. If the ozone generator has not worked for a long time (≥ 30 days) it needs heating and drying one hour before the ozone generator works.
- c. Heating the drying tube is required after the ozone generator working for 12 hours. Turn off the whole ozone generator and follow the below steps:
 - 1) Pull off the air pipe connected with the outlet 7, let the gas go out through the outlet 7 into the air.
 - 2) First, turn on the heating switch which is on position 26;
 - 3) Then, turn on power switch 1 of the whole machine and switch 2 of air pump (at this time, the ozone generator stops working). Temperature controller 25 will disconnect the power while heating tube 27 reached set temperature after heating for several minutes.
 - 4) After heating for about 1 hour, the power switch 1 of whole machine and switch 2 of air pump are on the position "off" ; the heating switch 26 is on the position "off" (see chart 5), and the heating work stops.
 - 5) Connect the pipe of air output 7, and the dry air of the outlet 7 can lead to the oxygen inlet 9 of the ozone generator.
 - 6) The drying material should be changed regularly. It is better to replace every 6-12 months.

9 Operation and connection method of ozone generator without air-drying or oxygen apparatuses



Fig. 9 Connection of ozone generator without air-drying or oxygen apparatuses

9.1 Operation and connection method of ozone generator without air-drying or oxygen apparatuses are shown in Fig.9. Connect air outlet 7 directly to oxygen inlet 9.

9.2 Ozone Generator without air-drying or oxygen apparatuses: does not increase system cost; and it is suitable for application with low demand of ozone production since the ozone production is unstable and is affected by environment humidity and purity; normally it is advised to use in a clean environment with air conditioner.

10 Operation and connection method of ozone generator with air-drying or oxygen apparatus (Special reminder: drying tank, drier, oxygen generator, oxygen bottle and other parts, which mentioned below are not included in standard ozone generator, and will need to purchase separately).

10.1. To ensure stable yield of ozone generator, dry and clean air or oxygen is required to the ozone generator. Using un-treated compressed air, which contains large amount of water, oil and dusts, will affect the yield and service life of ozone generator. Generally air-drying or oxygen apparatus are equipped with ozone generator.

10.2 Methods of using air-drying facilities or oxygen apparatus

10.2.1 Equip silica gel drying tank (**Special reminder:** Silica gel drier, indicated in the figure, can also be replaced by other driers; the drying tank needs to be purchased separately)

10.2.1.1



Fig. 10 Connection of silica gel drying tank



Fig.11 Proper inlet and outlet connection of silica gel drying tank



Fig. 12 Connection of silica gel drying tank

10.2.1.2 Notice items while using silica gel drying tank

- ① Condition permitting, silica gel drying tank should be suspended as shown in Fig.10; if not, it should be installed on ozone generator ($\frac{1}{4}$ " joint with screw nut should be replaced by $\frac{1}{4}$ " two-wnd male straight join)
- ② Proper inlet and outlet connection of silica gel drying tank are shown in Fig. 11; air flow direction is as the green arrow indicates. (Don't subject to the direction of original "OUT" and "IN" on the tank).
- ③ Replace silica gel in the tank when it is saturated and turns red from blue

10.2.1.3 Advantage and shortcoming of using silica gel drying tank: most economic, but silica gel has to be often dried and replaced.

10.2.2 Ozone generator with inner heating-drying tank

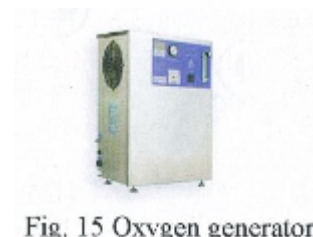
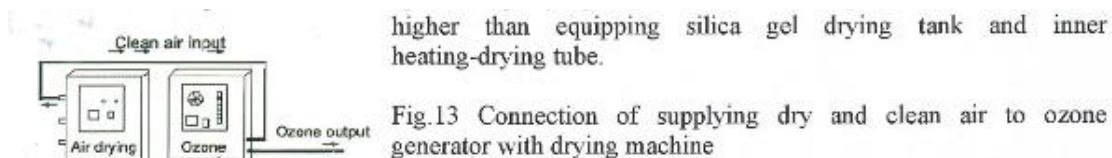
Structure and operating instruction of the product with inner heating-drying tank are indicated on chapter 8 in this manual.

10.2.3 Supplying dry and clean air to ozone generator with air drying machine

10.2.3.1 While using drying machine to supply dry and clean air to ozone generator, connect dry and clean air from drying machine to oxygen inlet 9 (Fig.4). Leave air outlet 7 of ozone generator in this manual (Fig.4) un-connected, and air pump switch 2 (Fig.4) off.

10.2.3.2 While using drying machine to supply dry and clean air to ozone generator, SOZ-YOB-G integrated oxygen/air ozone generator from our company can be a good substitution.

10.2.3.3 Advantage and shortcoming of using drying machine: convenient operation, but the cost is



10.2.4 Supplying oxygen to ozone generator with oxygen generator

10.2.4.1 While using oxygen generator to supply oxygen to ozone generator, lead oxygen from oxygen generator to oxygen inlet 9 (Fig.4). Leave air outlet 7 of ozone generator in this manual (Fig.4) un-connected, and air pump switch 2 (Fig.4) off.

10.2.4.2 While using oxygen generator to supply oxygen to ozone generator, SOZ-YOB-G integrated oxygen ozone generator from our company can be a good substitution.

10.2.4.3 Advantage and shortcoming of using oxygen generator: convenient operation, but the cost is higher than equipping silica gel drying tank and inner heating-drying tank.

10.2.5 To supply oxygen to ozone generator with oxygen cylinder

10.2.5.1 While using oxygen cylinder to supply oxygen to ozone generator, connect oxygen from oxygen cylinder to oxygen inlet 9 (Fig.4). Leave air outlet 7 of ozone generator in this manual (Fig.4) un-connected, and air pump switch 2 (Fig.4) off.

10.2.5.2 While using oxygen cylinder to supply oxygen to ozone generator, SOZ-YOB-G integrated oxygen ozone generator from our company can be a good substitution.

10.2.5.3 Advantage and shortcoming of using oxygen cylinder: convenient operation, but have to often buy oxygen and replace oxygen cylinder.

11 Fault inspection and analysis (110V or 220V OZ air-cooled series)

11.1 Maintenance staff must be qualified electricians; maintenance and repair must be conducted when the equipment is off power and air pressure is completely released; ensure safe maintenance.

11.2 After following inspections are completed, if there are still problems unsolved or cases related with maintenance, please contact local distributor or post-sale service department of our.

11.2.1 Power connection failure

11.2.1.1 Check whether power plug has been properly inserted; voltage is about 220V/230V (or 110V, if specified in purchase order from factory)

11.2.1.2 Check tube fuse; if it is burned out, replace one with the same type, and check whether input voltage is normal.

11.2.1.3 Check whether there is input and output voltage in 110V/220V transformer. If there is 110V input, but not 220V output, it indicates that the transformer is damaged. **(This inspection is only for 110V products)**

11.2.2 No output from ozone outlet

11.2.2.1 Check out whether air pump switch is open; whether there is input to oxygen inlet; whether air pump switch is damaged.

11.2.2.2 If there is oxygen input, examine whether flow rate is normal, whether the joints on pipeline is leaking or fallen off, or the pipeline is twisted.

11.2.3 No ozone, no working electric current, ozone light not bright (with gas output, but not ozone)

11.2.3.1 Check whether ozone volume regulating button is adjusted too low

11.2.3.2 Whether or not the main board indicating light is on

a. off: Check fuse tube of the main board is burned out; if so, replace one with the same type (3A), and check whether input voltage is normal; if it's burned out once more, the main board is damaged.

Check whether there is AC220V input on the 12# socket of the main board; whether temperature controller of ozone generator tube and ammeter are normal.

b. On: Check whether there is AC160V input on the 44# socket of the main board; if not, the main board is damaged.

11.2.4 No ozone, little working electric current, ozone light bright (with gas output, but not ozone)

Dismantle ground wire of high-voltage unit (black or brown). Clamp the ground wire to make voltaic arc on external shell of the equipment (grounding pole of ozone generator tube). Big voltaic arc (more than 10 mm) indicates that the ozone generator tube is damaged; small voltaic arc (less than 10mm) indicates that high-voltage unit is damaged.

12 Service manual for customers

Dear customer:

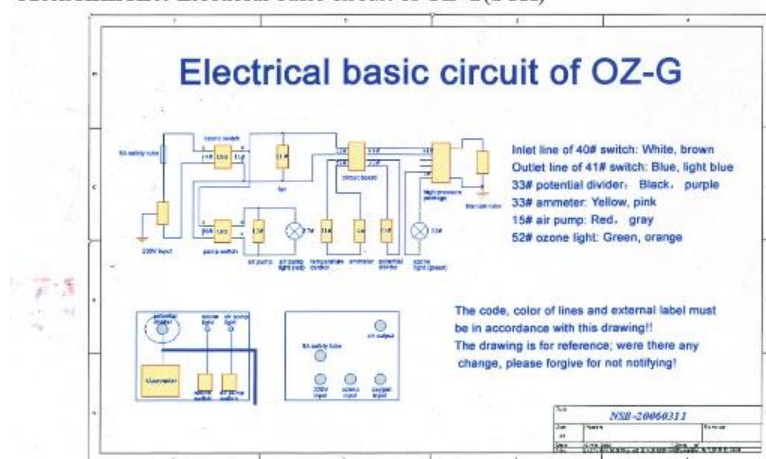
Thank you for choosing our products. To ensure you enjoy the perfect after sale service from our company, please read through this manual carefully after receiving the product, and keep it properly.

After sale service commitment :

1. All products (not including consumable material, accessories and the L series products) from our company are warranted for one year and lifetime maintenance from the date of purchasing.
2. The following occasions are excluded from the warranty, and our company may charge for the repairing materials.
 - A. Product damages due to high humidity working environment or Oxygen concentrator flooded by water;
 - B. Product damages due to unauthorized operation unless instructed by our company or authorized distributor;
 - C. Product damages due to natural disaster, or any other force majeure;
 - D. Fail to provide proof of purchase or warranty card.
3. If on-site service is required, customer will be required to pay for the cost of travelling, and our company or distributor can decide to come or not according to the distance.
4. In the case of sterilization standard is not met due to improper operation or malfunction of the product, our company does not take any responsibility.

12.2.5 Please refer to Special Reminder in the manual and Disclaimer on the first page.

Attachment: Electrical basic circuit of OZ-G(SCH)





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